ILLINOIS ENVIRONM .TAL PROTECTION AGENCY MEMORANDUM

DATE: July 28, 1982

TO: Delbert Haschemeyer, Deputy Director

FROM: John Student - Compliance Monitoring Section, DLPC
JDS

SUBJECT: Groundwater monitoring: preliminary trend analysis report

Refer to: 11780201-Macoupin County
Brighton/Brighton Landfill (Site #1)

11780203-Macoupin County
Brighton/Brighton Landfill #2 (Site #2)

Introduction

DLPC Site No. 11780201-Brighton Landfill (hereafter referred to as Site #1) consists of 32.11 acres of property adjacent and to the east of the 11.36 acres DLPC Site No. 11780203 Brighton Landfill #2 (referred to as Site #2). Site #1 began operation in 1971?, was issued a Development Permit on 7/31/75, and an Operating Permit on 11/12/75. Site #2 was issued a Development Permit on 3/14/79 and and Operating Permit on 9/13/79. Both sites are a subsidiary of Com-Pack Engineering, Inc., a Missouri corporation and operated by Gene Evans.

Site #1 is located in the south half of Section 30, Township 7 North, Range 9 West, Macoupin County, Illinois. Site #2 is located in the southwest quarter of Section 30, Township 7 North, Range 9 West, Macoupin County, Illinois.

Attachment I is a map of the sites showing boundaries and boring locations. IEPA designated numbers for constructed monitoring wells are shown on another map (Attachment II). Available boring logs and monitoring well construction reports are provided in Attachments III and IV, respectively.

As a condition of the permits, ground water has been sampled and analyzed on a quarterly basis for ammonia - NH_4 (as nitrogen), boron - B, iron - Fe, and residue on evaporation - ROE at Site #1. In addition to these parameters, chemical oxygen demand- COD has also been analyzed quarterly at Site #2.

Concentrations reported from sampling of the seven (7) required monitoring wells (G101, G103, and G104 at Site #1; G106, G107, G108, and G109 at Site #2) are tabulated in the "Trend Analysis Report"(Attachment V). The date of sample collection, the reporting laboratory, and the determined amount (in milligrams per liter) of each parameter has been tabulated in chronological order. To the right side of a listed value is the percentage the applicable "standard" limit for that parameter. At this time there are no legislated or adopted groundwater quality standards; the imposed standard limits are adopted from Public Food-Water Supply Standards. An asterisk (*) to the left of a collection denotes other parameters were analyzed in addition to the required quarterly parameters; these analyses are included in Attachment VII.

Attachment VI contains graphs which illustrate groundwater quality changes over time (data from Attachment V) among monitoring wells. For every required well and parameter, reported concentrations have been plotted by date of sample collection. Line symbols are used for comparison of monitoring wells.

Discussion

The data contained herein should not be considered true and accurate of groundwater quality at the site each day of sample collection. This is not to mean data reported was deliberately misrepresented. It should however be understood that errors can occur in the collection, preservation, and analyses of groundwater samples (Attachment VIII). In addition inaccuracies can develop from computerized data input, programming, recall, and transferal. Data should be tested for significance and compared through methods of statistical analyses. Any final characterization of monitoring well data should be interpreted with knowledge of the site's climate, geology,geography and history. Many of these conditions have not been thoroughly researched and are not included within the scope of this preliminary assessment.

Parameters which have been analyzed on a quarterly basis for Sites #1 and #2 were selected for their "indicative" capabilities. Studies have shown that boron, iron, ammonia, and total dissolved solids (i.e., residue on evaporation) appear to be reliable parameters for indicating groundwater pollution by leachate from municipal wastes.

Three (3) wells have been installed as a part of the groundwater monitoring program at Site #1. From the information presented from Site #1 development investigations, groundwater appeared to flow toward the northeast (towards the creek). Monitoring well G101 was installed upgradient to flow and located beyond the fill boundary in the southwest portion of Site #1 (Attachment II). Wells G103 and G104 were placed downgradient to groundwater flow in the valley of the creek which cuts through the northeast portion of the site.

The shallow sandy zone from which springs (or leachate seeps) have been occurring is stratigraphically higher than G103 and G104 well head elevations. To the best of my knowledge, well G101 was screened below this shallow groundwater zone also; however, neither boring logs nor well completion reports were located for these monitoring points. It is probable that none of the wells at either site are screened at this very shallow water bearing zone.

Data in the trend analysis report (Attachment V) were collected from the original G101 and G104 wells. Reconstructed G101 and G104 wells were placed within a few feet of the original wells, but may have been screened at a different interval(s). Further research is needed to distinguish relationships.

Note the trends of the four parameters at Site #1 illustrated by graphs in Attachment VI. The plots produced for G101 (the upgradient well) indicates lower parameter concentrations were detected than in downgradient wells.

The graph of boron concentration vs/time for Site #1 is probably the more visually acceptable of all the graphs. In general the other parameters exhibit the same trends as boron. Boron was found to be less than 0.5 mg/l during 1976 and 1977. Beginning in 1978, boron increased in both downgradient wells, while remaining relatively constant in well G101. Concentrations peaked in February, 1979 with 3.2 mg/l and 14.5 mg/l reported for wells G103 and G104, respectively. By 1980 boron was decreasing as were ammonia and iron concentrations.

Preliminary comparisons with background concentrations (through statistical analysis of data from wells G104 and G103) do not confirm with 99% certainty that pollution has occurred. However, during early 1978 through 1980, a leachate plume may have migrated to and then beyond the location of monitoring wells G103 and G104. As further research and compution is suggested, I cannot conclude that a violation of the Act has occurred.

Data collected for Site #2 seems to graph out with greater irregularity than for Site #1. Parameter concentrations are usually less than those detected at Site #1. Groundwater was determined to flow towards the southeast at Site #2. Well G107 (the downgradient well) plots out with consistently higher concentrations. I have not analyzed the data to the degree as accomplished with Site #1, but I suspect an additional problem in this area.

Conclusions and Recommendations

Groundwater may have been contaminated from onsite operations at Site #1. Samples collected from downgradient wells showed elevated concentrations of four indicative parameters during 1978-1980. Parameters were found to be relatively higher in concentration in a downgradient well than at upgradient wells at Site #2. However, insufficient data analyses have been conducted to establish the validity of the trend analysis.

The nature of the wastes disposed at Brighton #1 and #2 necessitates further investigations to be conducted at the sites and by a more complete analysis of available information. A thorough hydrogeological investigation should distinguish the relationship of the shallow water-bearing zone and deeper water bearing units. The shallow water-bearing zone may not be continuous nor a supply aquifer for any nearby water supply wells, but the zone is certainly a pathway for migration of leachate to the creek and thereby offsite.

It would become beneficial, in my opinion, to solicit consultation from the staff at the ISGS and/or ISWS. Considering the nature of wastes disposed, site operational history, and the discrepancies in borings noted from a recent IEPA investigation, the Agency should collect all available information before deciding what course of action to take in the present litigation process.

JS:mks

cc: Robert Kuykendall-DLPC
Michael Nechvatal-DLPC
Terry Ayers-DLPC
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Attachments

I-map of boring locations
II-map of monitoring well locations
III-available boring logs
IV-available monitoring well construction reports
V-trend analysis report of indicative parameters
VI-graphs illustrating parameter trends
VII-additional parameters analyzed
VIII-possible causes of erroneous groundwater analyses

ATTACHMENT VIII

POSSIBLE CAUSES OF ERRONEOUS GROUNDWATER ANALYSES

I. Sample collection

A. Monitoring well design, construction and location

1. construction material: sorption/leaching of organics/inorganics from casing materials

2. material penetrated: elevated parameters resulting from leaching of past fill, pre-disposal/storage site activities, or site anomalous materials

3. installation procedure: possible contaminant introduction from drilling tools, filtering material, seals and/or backfill

4. filtering and packer (seal) design: insufficient water yield or silting of casing; inadequate ground-surface water segregation

5. piezometer slot size, length, and depth setting: improper design to physical properties of aquifer, dilution of contaminant plume, contaminants not detected due to density stratification, aquifer may not be same aquifer as in "control" well(s) and not realized

6. proximity to other (off-site) pollutant sources: problem of differentiation/identification of point source.

B. Sampling procedure

1. error in procedure for obtaining sample: failure to eliminate stagnant water from well prior to collection of sample

2. collection: use of contaminated/incorrect/leaching/sorbing devices when obtaining sample

3. holding bottles: could be contaminated/incorrect/leaching/sorbing/non-preserving

4. filtering of inorganics: suspended material must be filtered prior to analysis; device could be contaminating/incorrect/misused; non-filtered samples will be misrepresentative

5. non-filtering of organics: organic samples should not be filtered; possible leaching/sorbing from device

6. changing of personnel who collect samples.

II. Preservation of representative samples

A. Increase/reduction/elimination of parameter concentration

1. variation/error in preservation technique(s): may also interfere with detection of specific parameter(s)

2. error in sample holding time

3. filtering/non-filtering

4. sorption/leaching from sample container.

III. Laboratory analyses

A. Improper laboratory procedures

1. methodology inappropriate for required accuracy

2. poor quality control: sample contamination

3. improper calibration/malfunction in equipment.

B. Variations of laboratory procedures among laboratories

1. tests used

2. equipment

3. personnel.

C. Interference from other parameter(s) in high concentrations

D. Human error in recording/reporting results.